



10 / 507166  
PCT/GB 2003 / 000985



INVESTOR IN PEOPLE

The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

09 SEP 2004

REC'D 19 MAY 2003

WIPO PCT

**PRIORITY  
DOCUMENT**  
SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH RULE 17.1(a) OR (b)

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the Request for grant of a Patent (PF1/77) bears a correction, effected by this office following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

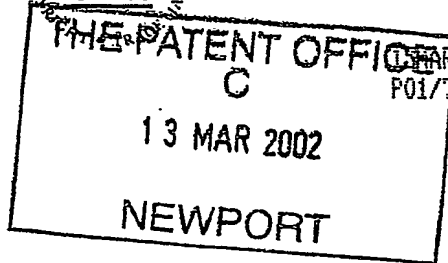
*R. Mahoney*

Dated 4 April 2003

**BEST AVAILABLE COPY**

# Patents Form 1/77

Patents Act 1977  
(Rule 16)



CHARD 02 E703196-3 002884  
P01/7700 0.00-0205893.1

The Patent Office

Cardiff Road  
Newport  
South Wales  
NP10 8QQ

## Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

P31048/LMM/MEA

2. Patent application number

(The Patent Office will fill in this part)

0205893.1

13 MAR 2002

3. Full name, address and postcode of the or of each applicant (underline all surnames)

OTV ~~Secrete Anonyme~~  
L'Aquarene, 1 Place Montgolfier  
St Maurice, Cedex  
94417  
France

Patents ADP number (if you know it)

8364390001

If the applicant is a corporate body, give the country/state of its incorporation

France

AE 11/77 12/03  
8339707001

4. Title of the invention

"Water Purification Apparatus"

5. Name of your agent (if you have one)

Murgitroyd & Company

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Scotland House  
165-169 Scotland Street  
Glasgow  
G5 8PL

Patents ADP number (if you know it)

1198013

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
- See note (d))

# Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description

9

Claim(s)

-

Abstract

-

Drawing(s)

1 + 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

-

Translations of priority documents

-

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

-

Request for preliminary examination and search (*Patents Form 9/77*)

-

Request for substantive examination (*Patents Form 10/77*)

-

Any other documents  
(please specify)

-

11.

I/We request the grant of a patent on the basis of this application.

Signature

Murgitroyd & Company

Date

12 March 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Mark Earnshaw

028 9032 441

## Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

## Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

1     Water Purification Apparatus

2

3     The present invention relates to the control of  
4     dispensing of water from water purification  
5     apparatus and units, particularly but not  
6     exclusively for laboratory water.

7

8     Water purification units for use in laboratories  
9     have been devised that remove levels of contaminants  
10    to very low levels. They typically contain a variety  
11    of technologies that remove particles, bacteria,  
12    ionic species and organic molecules. Water is  
13    recirculated within the unit to maintain the highest  
14    purity. When a user has required water he has  
15    typically opened a valve to dispense the amount of  
16    water required. A user will typically open the valve  
17    fully at first and partially close the valve as the  
18    amount of water dispensed approaches that required.  
19    This allows the user to make sure the amount of  
20    water does not exceed fill lines typically found on  
21    laboratory equipment.

22

1 US Patent No 5925240 discloses an improved system of  
2 controlling the water output of the unit by varying  
3 the pump speed and/or the outlet valve's cross  
4 section in conjunction with a timer to give a  
5 desired amount of water. Both the pump and the valve  
6 can introduce an inaccuracy into the amount  
7 dispensed. Pump speed is typically controlled by  
8 reducing the voltage applied to the pump and  
9 correlation between this voltage and water output  
10 can vary depending upon inlet water pressure,  
11 temperature, back pressure and any gas hold up.  
12 Valve throughput can also be affected by pressure  
13 and temperature.

14  
15 WO 01/27798 A discloses the use of a flow sensor to  
16 determine the amount of water dispensed by a  
17 deionization system and charge accordingly. It also  
18 includes a safety feature wherein the flow is halted  
19 if readings from the flow and pressure sensors  
20 indicate a missing/ failed nozzle.

21  
22 EP1134190A discloses a sensor fitted to a laboratory  
23 water purification unit which measures how much  
24 water has passed through the unit. A controller  
25 changes the pump speed between two speeds and opens  
26 a dispense valve to dispense an amount of water  
27 input into the units controller by the user.

28  
29 It is an object of the present invention to provide  
30 an improved control of water dispensing from a small  
31 scale, e.g. laboratory, water purification apparatus  
32 or unit.

1 Thus, according to one aspect of the present  
2 invention, there is provided a water purification  
3 apparatus having an inlet and an outlet, and at  
4 least one water purification means thereinbetween,  
5 wherein the outlet includes at least a first and  
6 second water release valves, the first release valve  
7 being operable at a first flow rate, and the second  
8 release valve being operable at a second flow rate.

9  
10 The outlet may include further water release valves.

11  
12 Thus, the rate of release of water through the  
13 outlet can be controlled by a first flow rate, or a  
14 second flow rate, or a combination thereof; or  
15 further separate or conjoined flow rates if further  
16 water release valves are used.

17  
18 The flow rate of each water release valve could be  
19 the same or different to the flow rate of every  
20 other water release valve. Preferably, the first  
21 flow rate is different to the second flow rate.

22  
23 In one embodiment of the present invention, the  
24 water release valves operate in parallel. Two or  
25 more valves could in addition or alternatively  
26 operate in series.

27  
28 In another embodiment of the present invention, the  
29 water release valves provide alternative flow paths  
30 for water through the outlet.

31

1 In yet a further embodiment of the present  
2 invention, each water release valve is independently  
3 controllable from every other water release valve.

4  
5 Preferably, at least one water release valve is  
6 operable at a relatively slow flow rate of, for  
7 example, up to 1.0 litres per minute, and at least  
8 one other water release valve is operable at a  
9 relatively fast flow rate of, for example, up to 2  
10 litres per minute.

11  
12 Preferably, the operation and/or flow rate of at  
13 least one water release valve is wholly or  
14 substantially dependant upon the operation and/or  
15 flow rate through at least one other water release  
16 valve. More preferably, operation of a 'faster'  
17 flow rate water valve is dependent upon operation of  
18 a relatively slow flow rate water release valve.

19  
20 In a further embodiment of the present invention,  
21 the water release valves are operable manually  
22 and/or automatically, and either separately or  
23 independently.

24  
25 In one arrangement, the apparatus has only one means  
26 for controlling the outlet flow and flow rate  
27 through all the release valves. For example  
28 operation of the control means opens a first,  
29 preferably 'slow' rate valve, followed after a  
30 reasonable time period or flow by opening of a  
31 second 'fast' rate valve. This arrangement could be  
32 reversed at or near the end of the desired outflow.

1

2 More preferably, the degree of operation of each  
3 water release valve is dependent upon the amount or  
4 volume of water to be dispensed through the outlet.

5

6 Preferably, the apparatus includes one or more water  
7 pumps. The or each pump may be separately or  
8 integrally linked with one or more of the water  
9 release valves, or at least to means for controlling  
10 the water release through the outlet.

11

12 In a further embodiment of the present invention,  
13 the apparatus includes a recirculation system to  
14 provide recirculation of any water treated by the or  
15 one of the water purification means, but not  
16 immediately required by the outlet. Such a  
17 recirculation unit may include one or more means  
18 such as non-return valves to maintain outlet  
19 pressure.

20

21 The apparatus may include one or more visual and/or  
22 aural alert and/or alarm means to provide  
23 confirmation and/or feedback to the operator of the  
24 flow rate of the outlet, and/or the flow rate of one  
25 or more of the water release valves.

26

27 The apparatus of the present invention may provide  
28 for the dispensing of water by any suitable  
29 arrangement based on time, volume, etc. Preferably,  
30 the apparatus of the present invention allows the  
31 operator to pre-set the volume of desired water to  
32 be dispensed, and the apparatus automatically



1 operates the or each relevant water release valve to  
2 provide a controlled (but usually variable) flow  
3 rate.

4  
5 According to a second aspect of the present  
6 invention, there is provided a method for dispensing  
7 water from a water purification apparatus having an  
8 inlet, an outlet, and at least one water  
9 purification means thereinbetween, the outlet  
10 including at least two water release valves, a first  
11 release valve being operable at a first flow rate,  
12 and at least a second water release valve being  
13 operable at a second flow rate,

14  
15 wherein an operator organises the dispense of water  
16 from the outlet through at least one of the water  
17 release valves.

18  
19 The present water purification apparatus provides  
20 the operator with the ability to very accurately  
21 obtain an exact volume of water desired.

22  
23 Preferably, at least one of the water release valves  
24 provides a relatively slow flow rate, particularly,  
25 but not exclusively, useable at the beginning and  
26 end of a water dispensing operation, whilst the  
27 second water release valve provides water at a fast  
28 flow rate, and is generally more used during the  
29 middle of the operation for dispersement of water.

30  
31 An embodiment of the present invention will now be  
32 described by way of example only and with reference

1 to the accompanying Figure 1, being a block-flow  
2 diagram of operation of an apparatus according to  
3 one embodiment of the present invention.

4  
5 Referring to the drawing, a unit 2 operates with  
6 feedwater being drawn into the unit 2 via an inlet  
7 and a solenoid valve, V3. The water passes through a  
8 series of purification steps and past sensors for  
9 temperature and resistivity before being dispensed  
10 to an outlet via two release valves V1 and V2.

11  
12 When water is not required, the pump recirculates  
13 the water to be purified through the purification  
14 steps maintaining it at the highest quality  
15 possible. A non return valve is included in the  
16 recirculation tubing to both prevent bypass of water  
17 to the outlet valves V1 and V2 without it passing  
18 through the purification steps, and also to provide  
19 a system pressure at which the water can be  
20 dispensed.

21  
22 Water can be dispensed by turning a switch (not  
23 shown), which firstly, opens the low flow, trickle  
24 valve V2. This will dispense dropwise initially with  
25 an audible 'click' for each drop dispensed. As the  
26 switch is turned the drops and associated 'clicks'  
27 increase in rate, until the unit 2 dispenses a low  
28 continuous flow. On further turning, the unit opens  
29 the larger valve V1 increasing the dispense rate. On  
30 yet further turning the pump speed is increased  
31 causing water to be dispensed at a rate up to the  
32 maximum flowrate of for example two litres per

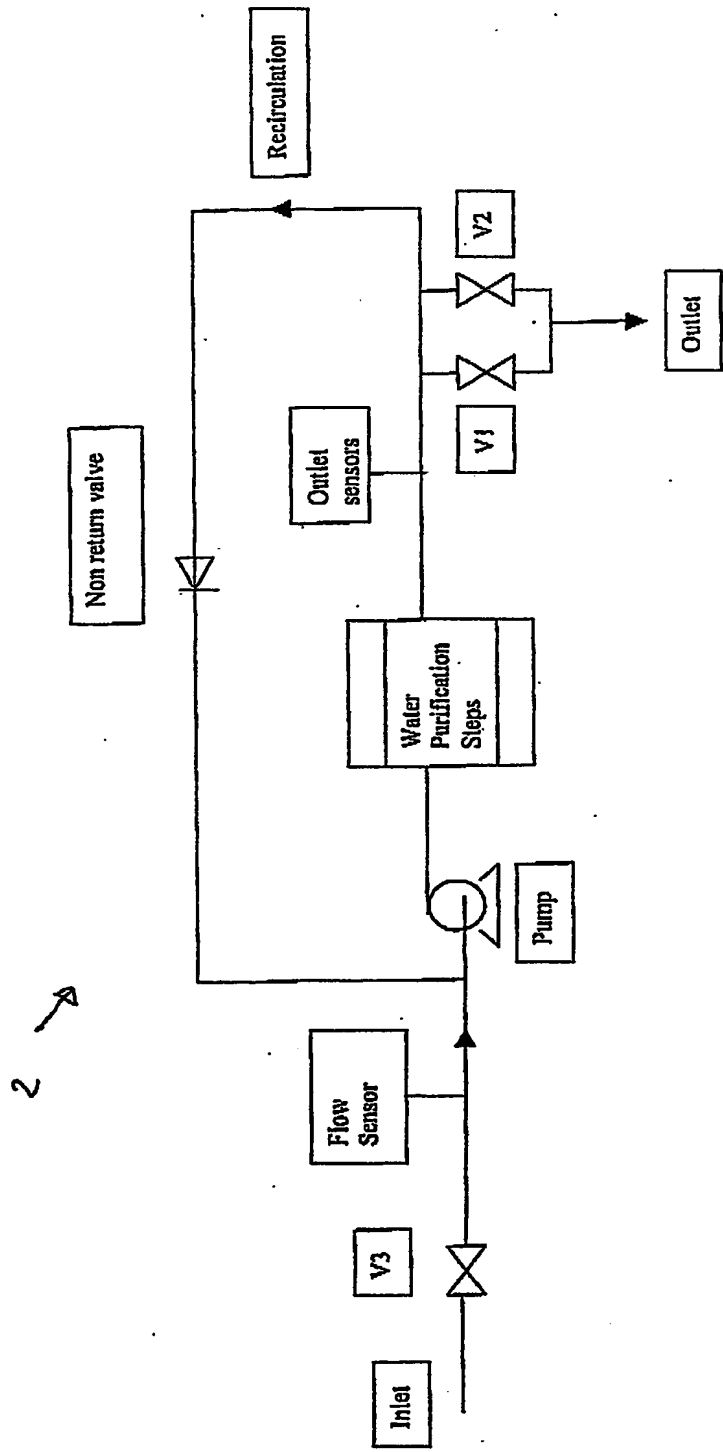
1 minute. Pushing the switch closes the valves and  
2 reduces the pump speed. When dispensing, water is  
3 drawn into the unit via V3. When not dispensing, or  
4 when dispensing at a low rate, the unrequired water  
5 is recirculated around the loop.

6  
7 When the operator wishes to dispense a fixed volume  
8 of purified water, he will input the amount, from,  
9 for example, 0.1 to 60 litres, via an operator  
10 interface on the unit 2 (not shown). When ready, the  
11 unit will open the valves V1 and V2 and increase  
12 pump speed as appropriate to the volume being  
13 dispensed. Water will be drawn into the unit via V3  
14 and the flow sensor will transmit the rate of flow  
15 to the processor via a series of pulses. The  
16 processor will integrate the pulses and from this  
17 determine the amount of water dispensed. When the  
18 amount of water dispensed approaches the amount  
19 specified by the operator, the pump will slow down  
20 followed by valve V1 closing and finally valve V2  
21 closing. The pump will continue to recirculate water  
22 around the loop.

23  
24 The use of the two valves and variation in pump  
25 speed allows a more controlled outlet measure as the  
26 amount of water approaches that required. As the  
27 water reaches the fill point of the vessel being  
28 filled, then the user is still able to stop the  
29 dispense without excessive water dispense. The user  
30 may also be able to reduce the flow by turning the  
31 switch in the opposite direction so that a slow drip

- 1 is dispensed as the water level approaches the fill
- 2 line typically found on laboratory glassware.

Fig 1



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**